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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

HASSANZADEH, PARVIZ

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 09/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/905,043

Applicant(s)

SRIVASTAVA ET AL.

Examiner

Parviz Hassanzadeh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 July 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13, 15-19 and 21-32 is/are pending in the application.
- 4a) Of the above claim(s) 21-32 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 and 15-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 21 July 2003 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: approved drawing correction.

DETAILED ACTION

Election/Restrictions

Applicant's election with traverse of Group I, claims 1-20 in Paper No. 9 is acknowledged. The traversal is on the ground(s) that the search and examination of the entire application can be made without serious burden. This is not found persuasive because the apparatus and the method are distinct for the reasons given in the previous office action and have acquired a separate status in the art as shown by their different classification.

The requirement is still deemed proper and is therefore made FINAL.

Claims 21-32 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected method, there being no allowable generic or linking claim.

Applicant timely traversed the restriction (election) requirement in Paper No. 9.

Drawings

The proposed drawings were received on 7/21/03. These drawings are approved by the Examiner.

New corrected drawings are required in this application. The corrected drawings are required in reply to the Office action to avoid abandonment of the application. The requirement for corrected drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-6, 8, 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Janos (US Patent No. 5,980,638) in view of Shang et al (US Patent No. 6,182,603 B1).

Janos discloses a system (Fig. 1) for plasma processing a wafer 7 (*workpiece*), the system comprising;

a microwave power source 3 (*a power generator for exciting a gas into a plasma*);

a *process chamber* 5 for processing the workpiece 7 placed therein;

a plasma conduit 4 (*tube*) for delivering plasma exhaust from the plasma tube into the process chamber;

an upper baffle plate 6a (*baffle plate assembly, disposed between the plasma tube 4 and the workpiece 7, in the plasma chamber 5*); and

a lower baffle plate 6b (*isolation means for shielding the workpiece from electric field potentials in a sheath created by activation of a supplemental ion source*) (column 1, line 42 through column 2, line 30).

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Janos fails to teach a supplemental ion source, located proximate the process chamber; the supplemental ion source, when activated, thereby enhancing the ion current of the plasma exhaust.

Shang et al teach a plasma processing apparatus (Fig. 1) including a remote plasma chamber 66 for providing radical ions into a showerhead 16, wherein an RF power source 36 is coupled to the showerhead 16 serving also as a plasma generating electrode (column 4, lines 15-45).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the RF plasma source as taught by Shang et al in the apparatus of Janos in order to produce plasma from gases entering the processing chamber.

Further regarding claim 3: the apparatus of Janos further includes quartz standoffs 8 for supporting the wafer 7 (*workpiece is mounted upon pins located within the process chamber*).

Further regarding claims 4-6: The showerhead electrode of Shang is made of a conductive material such as aluminum or anodized aluminum (column 6, lines 26-67) and the showerhead may have holes in the shape of cone as shown in Figs. 2A-2B). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the shape of the showerhead openings as taught by Shang et al in the apparatus of Janos in order to further direct the flow of exiting gas from the showerhead toward the workpiece.

Further regarding claims 8, 9: The selection of material composition among the commonly used corrosion resistance material such as quartz and anodized aluminum is considered to have been obvious to one of ordinary skill in the art at the time of the invention and thus, it dose not add any new structural element to the apparatus. Arrangement of the of the

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holes in the baffle plates for controlling the extend of radial ions (off-alignment) to charges ions (alignment) is also considered to have been obvious to one of ordinary skill in the art at the time of invention.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Janos (US Patent No. 5,980,638) in view of Shang et al (US Patent No. 6,182,603 B1) as applied to claims 1-6, 8, 9 above, and further in view of Fujikawa et al (US Patent No. 5,595,606).

Janos in view of Shang et al teach all limitations of the claims as discussed above except for liquid cooling channels running through the lower baffle plate.

Fujikawa et al teach a showerhead (Fig. 6) including a passage 84 provided in a lower block 62 of the showerhead so that a coolant such as water would flow therethrough for removing heat from the bottom block of the showerhead (column 6, line 54 through column 7, line 12).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the cooling passage as taught by Fujikawa et al in the apparatus of Janos in view of Shang et al in order to remove heat from the lower baffle plate.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Janos (US Patent No. 5,980,638) in view of Shang et al (US Patent No. 6,182,603 B1) as applied to claims 1-6, 8, 9 above, and further in view of Lee et al (US Patent No. 5,968,275).

Janos in view of Shang et al teach all limitations of the claims as discussed above except for an impingement disk disposed atop the upper baffle plate for allowing a plasma discharge to impinge thereupon and be directed through the plurality of holes.

Lee et al disclose a plasma processing apparatus (Fig. 1) including a deflector plate 104 for blocking radiation due to plasma (column 1, line 41-60).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the deflector plate as taught by Lee et al in the apparatus of Janos in view of Shang et al in order to block radiation due to plasma which also would block plasma species directed thereto. According to *in re Kronig*, 539 F.2d 1300, 190 USPQ 425 (CCPA 1976) a combination rejection is not deficient merely because Applicants allege a different advantage than that taught by the reference.

Claims 11-13, 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Janos (US Patent No. 5,980,638) in view of Shang et al (US Patent No. 6,182,603 B1) and Fujikawa et al (US Patent No. 5,595,606).

Janos in view of Shang et al teach all limitations of the claims as discussed above except for liquid cooling channels running through the lower baffle plate.

Fujikawa et al teach a showerhead (Fig. 6) including a passage 84 provided in a lower block 62 of the showerhead so that a coolant such as water would flow therethrough for removing heat from the bottom block of the showerhead (column 6, line 54 through column 7, line 12).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the cooling passage as taught by Fujikawa et al in the apparatus of Janos in view of Shang et al in order to remove heat from the lower baffle plate.

Further regarding claim 11 (change in shape): It was held in *re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966) that the shape was a matter of choice which a person of ordinary

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skill in the art would have found obvious absent persuasive evidence that the particular shape was significant. (Also see MPEP 2144.04(d)).

Therefore, it would have been obvious to one with ordinary skill in the art at the time the invention was made to select a V-shaped cooling channel rather than a zig-zag pattern as taught by Fujikawa et al as an obvious alternative change in shape with no particular advantage for the same purpose of cooling the plate.

Further regarding claims 12-13: The showerhead electrode of Shang is made of a conductive material such as aluminum or anodized aluminum (column 6, lines 26-67) and the showerhead may have holes in the shape of cone as shown in Figs. 2A-2B). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the shape of the showerhead openings as taught by Shang et al in the apparatus of Janos in order to further direct the flow of exiting gas from the showerhead toward the workpiece.

Further regarding claims 15-18: The selection of material composition among the commonly used corrosion resistance material such as quartz and anodized aluminum is considered to have been obvious to one of ordinary skill in the art at the time of the invention and thus, it dose not add any new structural element to the apparatus. Arrangement of the of the holes in the baffle plates for controlling the extend of radial ions (off-alignment) to charges ions (alignment) is also considered to have been obvious to one of ordinary skill in the art at the time of invention.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Janos (US Patent No. 5,980,638) in view of Shang et al (US Patent No. 6,182,603 B1) and Fujikawa et

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al (US Patent No. 5,595,606) as applied to claims 11-13, 15-18 above, and further in view of Lee et al (US Patent No. 5,968,275).

Janos in view of Shang et al and Fujikawa et al teach all limitations of the claims as discussed above except for an impingement disk disposed atop the upper baffle plate for allowing a plasma discharge to impinge thereupon and be directed through the plurality of holes.

Lee et al disclose a plasma processing apparatus (Fig. 1) including a deflector plate 104 for blocking radiation due to plasma (column 1, line 41-60).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the deflector plate as taught by Lee et al in the apparatus of Janos in view of Shang et al and Fujikawa et al in order to block radiation due to plasma which also would block plasma species directed thereto. According to *in re Kronig*, 539 F.2d 1300, 190 USPQ 425 (CCPA 1976) a combination rejection is not deficient merely because Applicants allege a different advantage than that taught by the reference.

Response to Arguments

Applicant's arguments filed 7/21/03 have been fully considered but they are not persuasive.

Applicants assert that the baffle plate assembly 54 includes a lower baffle plate 54b, preferably made from a material such as anodized aluminum, **and is grounded** to act as the opposing capacitive electrode to antenna 78 or 92. Accordingly, *since the baffle assembly is grounded, it provides the isolation means for the capacitive sheath potentials.*

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The Examiner argues that the limitation “**the lower baffle plate is grounded**” is not recited in the claims. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In Re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Applicants further assert that since the baffle plates of Jones are disposed within the chamber, these baffles can not be coupled to the exterior RF source of Shang et al resulting a supplemental ion source located proximate the process chamber.

The Examiner argues that the claims do not require the baffle plates being connected to the exterior RF source.

Applicants assert that the cooling channels are V-shaped rather than zig-zag as taught by Fujiwaka et al.

The Examiner argues that it was held in *re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966) that the shape was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular shape was significant. (Also see MPEP 2144.04(d)). Therefore, it would have been obvious to one with ordinary skill in the art at the time the invention was made to select a V-shaped cooling channel rather than a zig-zag pattern as taught by Fujikawa et al as an obvious alternative change in shape with no particular advantage and for the same purpose of cooling the plate.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Barnes et al (US Patent No. 6,239,553 B1) teach a plasma processing apparatus (Fig. 4) including a remote plasma source and an inductive plasma source disposed on a processing chamber;

Srivastava (US Patent No. 6,225,745 B1) disclose a plasma processing apparatus (Fig. 1a) including a baffle assembly disposed between a remote plasma discharge tube and workpiece;

Shang et al (US Patent No. 5,788,778) teach a plasma processing apparatus (Fig. 1) including a remote plasma source and an additional RF plasma source disposed between a gas distribution baffle and a workpiece;

Sun et al (US Patent No. 6,432,255 B1) teach a plasma processing apparatus (Fig. 1) including a remote plasma source and an additional RF plasma source disposed between a gas distribution baffle and a workpiece;

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Oda et al (US Patent No. 5,010,842) teach a plasma reactor (Fig. 3) comprising a gas distribution means 30 including *quartz* plates 13a, 13b each provided with a multiplicity of ports 14;

Kitagawa (US Patent No. 6,127,703 B1) teach a plasma reactor including a *cooled* plate 106 having a plurality of holes;


Kitagawa (US Patent No. 6,217,704 B1) teach a plasma reactor including two plasma source; and

Kamarehi et al (US Patent No. 6,412,438 B2) teach a plasma reactor (Fig. 15) including two baffle plates 151, 155.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Parviz Hassanzadeh whose telephone number is (703)308-2050. The examiner can normally be reached on Tuesday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (703)308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are (703)872-9310 for regular communications and (703)872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0661.


Parviz Hassanzadeh
Primary Examiner
Art Unit 1763

September 2, 2003